

## Labrid Fishes of the Genus *Paracheilinus*, with Descriptions of Three New Species from the Philippines

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**Abstract** Three new labrid fishes of the genus *Paracheilinus* are described from the Philippine Islands: *P. lineopunctatus*, distinctive in its small size, rounded caudal fin, the first four to six dorsal soft rays prolonged in males, and a color pattern of broken linear dark markings following scale rows; *P. carpenteri*, a close relative of *P. mccoskeri* from the Indian Ocean, with a rounded caudal fin, two to four dorsal rays prolonged in males (every other ray elongate, beginning with the first), and six dark (blue in life) stripes on the body (four of which are confined to anterior part); *P. angulatus* with an emarginate caudal fin, no prolonged anterior dorsal rays, angular posterior soft portions of the dorsal and anal fins, and no dark markings on the body. This brings the total species of the genus to seven; the others: *P. octotaenia* Fourmanoir from the Red Sea, *P. filamentosus* Allen from Indonesia and Melanesia (the range here extended to the Philippines), *P. mccoskeri* Randall and Harmelin-Vivien from the Comoro Islands (the range here extended to the eastern Andaman Sea), and *P. hemitaeniatus* Randall and Harmelin-Vivien from Madagascar.

Fourmanoir in Roux-Estève and Fourmanoir (1955) described *Paracheilinus octotaenia*, as a new genus and species of wrasse, from a single 64-mm specimen from the Red Sea. His specific name was well chosen for the eight stripes on the body; but the meaning of the generic name is misleading because this genus is most closely related to *Cirrhilabrus*. Apart from having IX,11 dorsal rays instead of XI,9 of *Cirrhilabrus*, there is little of significance in external characters to differentiate *Paracheilinus* from *Cirrhilabrus*. Fishes of both these genera have a similar mode of life; they form aggregations on reefs and feed on zooplankton a meter or more above the substratum. With the approach of danger, they return to the shelter of the reef. Males are more colorful and generally larger in size than females; they have large harems. During courtship the males display an intensification of color, particularly of iridescent blue, accompanied by the elevation of fins (Moyer and Shepard, 1975).

Allen (1974) described the second species of *Paracheilinus* from the Solomon Islands, New Guinea, and Molucca Islands, Indonesia, naming it *P. filamentosus* for the prolongation of two to six dorsal soft rays. He pointed out the close relationship of *Paracheilinus* to *Cirrhilabrus*.

Springer and Randall (1974) described the curious double structure of the pupil of *Cirrhilabrus* which they also reported in the genera

*Paracheilinus* (see Fig. 1 herein), *Pseudocheilinus*, *Pseudocheilinops*, and *Pteragogus*, thus suggesting that these taxa may represent a natural assemblage.

Randall and Harmelin-Vivien (1977) reviewed the genus *Paracheilinus* and described two more species, *P. hemitaeniatus* from Madagascar and *P. mccoskeri* from the Comoro Islands.

The authors have obtained three additional new species of *Paracheilinus*, all from the Philippine Islands, the descriptions of which are given below following the generic diagnosis and key to the species.

Type specimens of the new species have been variously deposited in the following institutions: Academy of Natural Sciences of Philadelphia (ANSP); Australian Museum, Sydney (AMS); Bernice P. Bishop Museum, Honolulu (BPBM); British Museum (Natural History), London (BM (NH)); California Academy of Sciences, San Francisco (CAS); Museum National d'Histoire Naturelle, Paris (MNHN); United States National Museum of Natural History, Washington, D.C. (USNM); and Department of Zoology, University Museum, University of Tokyo (ZUMT).

Counts and measurements were made in the manner of Randall (1972), except caudal concavity which was not used in that paper. This is taken as the horizontal distance between verti-

cals at the distal tips of the longest and shortest caudal rays. In the descriptions of the new species, data in parentheses refer to paratypes. Some characters common to all species of the genus are given only in the generic diagnosis. Diagnoses are provided for previously described species.

### *Paracheilinus*

*Paracheilinus* Fourmanoir, in Roux-Estève and Fourmanoir, 1955. Ann. Inst. Oceanogr., 30: 199 (type species, *Paracheilinus octotaenia* Fourmanoir, by original designation).

**Description.** Dorsal rays IX (rarely VIII or X), 11; anal rays III, 9 (rarely 8 or 10); pectoral rays 14 (rarely 13 or 15), the uppermost rudimentary; pelvic rays I, 5: principal caudal rays 13 (median 11 branched); lateral line interrupted, the pored scales 14 to 17+4 to 9; median predorsal scales 5 (rarely 4 or 6); circumpeduncular scales 16; two rows of scales on cheek; branchiostegal membranes covered by one row of scales; gill rakers 12 to 18; branchiostegal rays 5; vertebrae 25; depth of body 2.8 to 4.1 in standard length; scleral cornea of pupil divided nearly vertically into two roundish juxtaposed portions; snout short, 3.3 to 4.8 in head; mouth small, oblique, the maxilla not reaching a vertical at front edge of eye, the premaxilla slightly protractile; three pairs of laterally projecting canine teeth anteriorly in upper jaw, the third pair the largest and most strongly recurved; a single pair of canine teeth anteriorly in lower jaw (canines in both jaws larger and more laterally curved in larger individuals); no canine at corner of mouth; no teeth on roof of mouth; lower margin and corner of preopercle thin and membranous, the upper margin with a finely serrate bony edge (serrae may be reduced to just a few on some large individuals), except upper part which is covered by a large scale; scales on head and thorax large; snout, chin, and interorbital space naked; dorsal and anal spines slender, progressively longer posteriorly; one to six filamentous dorsal soft rays in four of the seven species; caudal fin varying from rounded to strongly lunate; pelvic fins inserted below lower pectoral base, the fin tips not reaching or just reaching anus; an elongate auxiliary scale above and adjacent to each pelvic fin, and a large median scaly process consisting of two overlapping elongate

gate pointed scales extending from base of pelvic fins.

### Key to the species of *Paracheilinus*

- 1a. Caudal fin rounded .....2
- 1b. Caudal fin emarginate to lunate .....5
- 2a. No dorsal rays prolonged; gill rakers 16 to 18; body of adults with eight continuous narrow dark stripes (juveniles with only about four upper stripes visible in preservative) (Red Sea).....*P. octotaenia*
- 2b. One or more dorsal rays prolonged, at least in adults; gill rakers 13 to 17; stripes, if present, not exceeding five, only one of which continuous full length of body....3
- 3a. Color pattern of longitudinal rows of dark dots and short dashes; ninth dorsal spine 5.4 to 6.2 in SL (Philippines).....*P. lineopunctatus*, sp. nov.
- 3b. Color pattern of four or five solid dark stripes (blue in life) on body (disregarding one at dorsal fin base), the uppermost interrupted above pectoral fin, one or two short stripes under pectoral fin, a long stripe from lower pectoral base to caudal base, and a short one on thorax; ninth dorsal spine 6.2 to 7.1 in SL.....4
- 4a. Only a single dorsal soft ray (the first) prolonged in adults (at a SL of about 38 mm or more); penultimate dorsal soft ray of males 1.6 to 2.0 in head; a single short dark stripe under pectoral fin (originating at upper pectoral base); gill rakers 13 to 15 (Indian Ocean).....*P. mccoskeri*
- 4b. Two to four dorsal soft rays prolonged in adults; penultimate dorsal soft ray of males 1.8 to 2.2 in head; two short dark stripes under pectoral fin; gill rakers 14 to 17 (Philippines)...*P. carpenteri*, sp. nov.
- 5a. Adults with two to six dorsal soft rays prolonged as filaments; non-filamentous rays of dorsal fin approximately equal in length, the longest 1.7 to 2.3 in head length; at least one longitudinal dark line continuing onto posterior half of body of preserved specimens (Indonesia, Melanesia, and Philippines).....*P. filamentosus*
- 5b. No dorsal soft rays prolonged as filaments; dorsal soft rays progressively longer to the ninth or tenth, the longest ray 1.0 to 1.3 in head length; no dark longitudinal lines

- continuing onto posterior half of body of preserved specimens (disregarding narrow band at base of dorsal fin).....6
- 6a. Depth of body 3.2 to 3.3 in standard length; caudal fin of adult males emarginate; no dark markings on body (one to four dark horizontal lines on head) (Philippines) .....*P. angulatus*, sp. nov.
- 6b. Depth of body 3.3 to 4.1 in standard length; caudal fin of adult males deeply lunate, the caudal lobes filamentous; six longitudinal dark brown lines on anterior third of body of preserved specimens (Madagascar).....*P. hemitaeniatus*

***Paracheilinus octotaenia***

(Pl. 1A)

*Paracheilinus octotaenia* Fourmanoir in Roux-Estève and Fourmanoir, 1955: 199, fig. 1 (type locality, île Abulat, Red Sea).

**Diagnosis.** Caudal fin rounded; no dorsal rays prolonged; gill rakers 16 to 18; profile of forehead convex; snout short, 3.4 to 4 in head; males with eight uninterrupted longitudinal dark lines (blue in life) on body, females with four or five; head with a mid-dorsal dark line, two crossing interorbital, two extending posteriorly from eye, and one passing from snout diagonally under eye and across lower operculum.

**Remarks.** *Paracheilinus octotaenia* is known only from the Red Sea, occurring from the most northern part of the Gulf of Aqaba to at least as far south as 20°N. It is the largest species of the genus; the largest Bishop Museum specimen measures 71 mm SL, but larger individuals have been observed.

***Paracheilinus lineopunctatus*, sp. nov.**

(Pl. 1B; Table 1)

**Holotype.** BPBM 22506, male, 38.8 mm SL, Philippine Islands, Mactan Island (east of Cebu), east side off marine laboratory of the University of San Carlos, outer edge of fringing reef, rubble bottom, 15 m, spear, J. E. Randall, 24 August 1977.

**Paratypes.** BPBM 22114, 6, 25.3~48.7 mm SL, same data as holotype except some specimens taken with quinaldine; USNM 219335, 4, 26.5~51.2 mm SL, Philippine Islands, Mactan Island (east of Cebu), Buyong Beach, base of vertical reef front, coral rubble, 34~40 m, ro-

tenone, V. G. Springer, K. E. Carpenter, and R. Miclat, 2 June 1978; BPBM 22447, 5, 32.4~38.0 mm SL, ANSP 140167, 37.0 mm SL, AMS 1.20696-001, 33.2 mm SL, BM(NH) 1979. 1.4.3, 37.2 mm SL, CAS 42524, 39.7 mm SL, MNHN 1978-767, 36.2 mm SL, ZUMT 54, 165, 30.9 mm SL, Philippine Islands, Luzon, Batangas, Caban Island, southwest side, rubble, *Fungia*, and soft coral bottom, 30 m, rotenone, J. E. Randall, G. W. Tribble, R. P. H. Rutherford, and K. E. Carpenter, 28 July 1978; BPBM 22507, 50.2 mm SL, Philippine Islands, Sumilon Island (east of southern tip of Cebu), east side, coral rubble, 17 m, spear, K. E. Carpenter and V. Albaladejo, 18 September 1978.

**Diagnosis.** Caudal fin rounded; first four to six dorsal soft rays prolonged as filaments in males (first ray slightly prolonged on large females); gill rakers 12 to 16; depth of body 3.0 to 3.35 in standard length; ninth dorsal spine 5.4 to 6.2 in standard length; longitudinal rows of dark dots and short dashes on body.

**Description.** Dorsal rays IX, 11; anal rays III, 9 (one of 16 paratypes with 10); pectoral rays 14 (one of 16 paratypes with 15), all except upper two branched; lateral-line scales 15+6 (14 to 17+5 or 6); scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 6 (6 or 7); median predorsal scales 5 (one of 16 paratypes with 6); gill rakers 13 (12 to 16).

Depth of body 3.36 (2.97~3.21) in SL; width of body 2.09 (2.09~2.43) in depth; head 3.04 (2.76~3.06) in SL; profile of forehead convex; snout 3.06 (3.50~3.95) in head; orbit diameter 3.74 (3.07~4.41) in head; interorbital space convex, the bony width 3.87 (3.99~4.41) in head; least depth of caudal peduncle 2.09 (2.10~2.30) in head.

Mouth small, terminal, and oblique, the maxilla not reaching a vertical at front edge of orbit; dentition typical of the genus, with three pairs of canines at front of upper jaw, the lateral ones larger and more outcurved, and a single pair of oblique laterally curved canines at front of lower jaw; a series of small conical teeth in jaws (about 25 on each side of upper jaw and 20 on each side of lower jaw of holotype). Lower lip with a thin flap projecting downward on side of jaw, its greatest depth contained about 3 times in orbit

Table 1. Proportional measurements of type specimens of *Paracheilinus lineopunctatus* expressed as a percentage of the standard length.

	Holotype	Paratypes				
	BPBM 22506 Male	BPBM 22114 Juv.	BPBM 22447 Female	BPBM 22114 Male	BPBM 22114 Male	USNM 219335 Male
Standard length (mm)	38.8	25.3	36.9	42.5	48.7	50.9
Depth of body	29.7	33.6	31.2	32.5	33.5	31.4
Width of body	14.2	14.6	14.9	14.1	13.8	13.2
Head length	32.9	36.3	33.0	32.7	33.9	34.0
Snout length	9.0	9.9	9.1	9.2	9.7	8.6
Orbit diameter	8.8	11.5	8.7	8.4	7.7	8.3
Bony interorbital width	8.5	8.7	8.1	8.2	8.2	7.7
Length of upper jaw	8.8	8.9	8.7	8.9	8.5	8.4
Least depth of caudal peduncle	15.7	15.8	15.7	15.6	15.8	15.1
Length of caudal peduncle	18.3	17.4	18.2	18.2	17.5	17.9
Snout to origin of dorsal fin	32.7	35.9	34.1	32.9	32.8	32.0
Snout to origin of anal fin	57.0	61.7	61.9	58.1	58.0	57.6
Length of caudal fin	26.0	27.3	25.7	26.0	26.2	25.0
Length of pectoral fin	20.1	21.7	20.3	20.9	21.3	21.7
Length of pelvic fin	17.0	17.9	15.7	16.7	18.1	17.3
Length of first dorsal spine	5.7	6.3	5.7	5.4	5.7	5.5
Length of last dorsal spine	18.6	16.0	18.2	18.8	16.8	18.1
Length of longest dorsal ray	51.3	17.8	20.9	56.4	54.2	55.4
Length of dorsal fin base	53.9	53.0	52.8	56.0	54.0	56.4
Length of first anal spine	10.6	9.0	9.8	10.8	10.0	10.2
Length of third anal spine	14.2	13.8	13.3	14.1	13.3	13.8
Length of longest anal ray	25.5	15.6	17.1	29.4	26.9	28.5
Length of anal fin base	26.3	26.9	25.7	29.9	29.0	29.4

diameter; gill rakers short, the longest on first arch contained about 2 times in longest gill filament, and about 4 times in orbit diameter. Nostrils very small and inconspicuous, no larger than pores of the lateralis system, the posterior nearly in line with a vertical from front of orbit and with a horizontal from top of orbit, the anterior in a short membranous tube; distance between anterior and posterior nostrils contained about 3 times in orbit diameter.

Head covered with large scales except snout, chin, and all of interorbital space; two rows of scales on cheek between eye and corner of preopercle; a single row of large elongate pointed scales along base of dorsal and anal fins; large scales on base of caudal fin extending almost half length of fin; paired fins without scales except for two large overlapping medial scales extending posteriorly from base of pelvic fins.

Orbit encircled by 11 prominent pores of cephalic lateral-line system; two mid-dorsal pores in upper interorbital space; two promi-

nent pores dorsally on snout, one in front of anterior nostril and one forming the apex of a triangle with nostrils; a series of pores on nape at anterior margin of scaled region, linking with the most posterior of the two above-mentioned mid-dorsal pores; a series of pores along preopercular edge joining with four on mandible.

Caudal fin slightly to moderately rounded (less rounded in juveniles than adults), the longest rays 1.26 (1.26~1.36) in head. Origin of dorsal fin over second lateral-line scale, slightly anterior to upper pectoral base; first dorsal spine 5.79 (5.77~6.18) in head; remaining dorsal spines progressively longer, the ninth 1.77 (1.81~2.27) in head; first four to six dorsal soft rays greatly prolonged in males, the first the longest, 1.95 in SL of holotype (as long as 1.77 in SL on paratypes); first dorsal soft ray slightly prolonged on large females. Origin of anal fin below base of first dorsal soft ray; first anal spine moderately long, 3.10 (3.03~4.03) in head; third anal spine 2.31 (2.32~2.63) in head; penul-

timate anal ray longest, 1.29 (1.11~2.33) in head (longer in adults than juveniles); pectoral fins not long, reaching slightly posterior to a vertical at pelvic fin tips, the longest ray 1.64 (1.56~1.67) in head; pelvic fins short, not reaching or barely reaching anus (shorter on juveniles and females than males), 1.93 (1.87~2.10) in head.

Color of holotype (a male) in alcohol pale with brownish pigment on about dorsal half of body, mostly concentrated in a longitudinal series of dashes and dots along centers of scale rows; dorsal series also with short vertical lines on scales as well as the horizontal; postorbital part of head with five partially broken, slightly oblique to horizontal dark lines extending posteriorly from eye; median fins with spines pale bluish, the rays purple (darker on dorsal and anal than caudal fin), the membranes clear except base of dorsal fin, last four interradial membranes of dorsal fin and caudal membranes which are dark brown (basal half of caudal fin with dark pigment arranged in vertical rows of blotches and posterior margin of fin narrowly pale); paired fins pale. Females are much paler with dark markings on dorsal half of body and pectoral region basically the same as on males but subdued; fins without pigment, the rays of median fins pale bluish.

Color of holotype when fresh orange-red, the markings of the scales dark brown; postorbital head with faint yellow stripes which continue onto thorax and abdomen; large whitish areas on thorax and abdomen; dorsal fin mottled orange-red and bluish, the rays purplish, except membranous part of produced rays which is orange-red; caudal fin orange-red blotched with dark brown on basal scaled portion, dark purplish on outer half except for narrow pale bluish posterior margin; anal and pelvic fins red with purplish rays; pectoral fins pale, the rays edged with red. Females are colored a similar orange-red and have yellow longitudinal bands on side of head behind eye and anteriorly on side of body, but they lack the well developed dark markings (the longitudinal lines more red than brown); the fins are pale, the dorsal with a yellowish cast and flecks of whitish, the caudal with elongate pink dots along edges of the rays, the anal with some scattered blue dots.

**Remarks.** Named *lineopunctatus* in reference

to the longitudinal broken markings along the scale rows.

This is the smallest species of the genus, the largest specimen measuring only 51.2 mm SL. It occurs in small aggregations over rubble bottom. The type specimens were collected from the depth range of 15 to 40 m.

*Paracheilinus lineopunctatus* is one of four species which exhibit elongate soft dorsal rays in adults, or at least in males. It is readily distinguished from *P. filamentosus* by having a rounded instead of emarginate or lunate caudal fin, from *P. mccoskeri* by having four to six dorsal rays produced in the male instead of just one, and from both *P. mccoskeri* and *P. carpenteri* in having longer dorsal spines. The prolonged dorsal rays of *P. lineopunctatus* are the series of adjacent anterior rays whereas on *P. carpenteri* they are every other ray, beginning with the first.

#### *Paracheilinus mccoskeri*

(Pl. 1C)

*Paracheilinus mccoskeri* Randall and Harmelin-Vivien, 1977: 332, fig. 2 (type locality, Grande Comore Island, Comoro Islands).

**Diagnosis.** Caudal fin slightly rounded; first dorsal soft ray prolonged (at a standard length greater than about 38 mm); gill rakers 13 to 15; profile of forehead nearly straight; depth of body 3.0 to 3.35 in SL; snout 3.6 to 4.1 in head; last dorsal spine 6.5 to 6.9 in SL; penultimate dorsal soft ray of adults 1.6 to 2.0 in head; three dark stripes (blue in life) along side of body, the uppermost interrupted (just above pectoral fin); the middle one short, just under upper part of pectoral fin, and the lowermost continuous from lower pectoral base to caudal base; a dark stripe from nape along base of dorsal fin; three stripes on head extending posteriorly from eye, one continuous with upper stripe on side of body, one extending to upper pectoral base (in line with horizontal one on snout), and one from corner of mouth to thorax.

**Remarks.** *P. mccoskeri* was described from specimens collected in the Comoro Islands in the western Indian Ocean. The junior author and Nicholas Polunin collected a male specimen, BM (NH) 1979.1.3.5, 56.1 mm SL, from the Similan Islands in the eastern Andaman Sea. Recently the senior author collected a male at

Male Atoll, Maldive Islands (BPBM 22590, 57.0 mm SL) which is illustrated herein as Pl. 1C.

*Paracheilinus carpenteri*, sp. nov.

(Pl. 2A, B; Table 2)

**Holotype.** BPBM 22424, male, 39.0 mm SL, Philippine Islands, Mactan Island (east of Cebu), east side off marine lab of the University of San Carlos, base of vertical reef front, rubble bottom in 40 m, quinaldine, J. E. Randall, 1 August 1978.

**Paratypes.** BM(NH) 1979.1.3.4, 60.7 mm SL, Philippine Islands, Cebu Strait, northwest passage between Cabulan Island and Vandanon Island, isolated corals on sand, 27 m, spear, R. Lubbock, 17 August 1976; BPBM 22116, 52.0 mm SL, same locality as holotype, spear, J. E. Randall, 24 August 1977; BPBM 21156, 2, 35.0~36.8 mm SL; same locality as holotype, 36.5~40 m, spear, K. E. Carpenter and H. E. Demarest, 7 April 1978; USNM 219334, 12, 17.6~36.5 mm SL, same locality and depth,

rotenone, V. G. Springer, K. E. Carpenter, and R. Mclat, 2 June 1978; BPBM 22465, 10, 21.6~65.8 mm SL, ANSP 140166, 39.0 mm SL, AMS I. 20697-001, 32.3 mm SL, CAS 42523, 39.8 mm SL, MNHN 1978-766, 37.9 mm SL, ZUMT 54,166, 37.9 mm SL, Philippine Islands, Luzon, Batangas, Caban Island, southwest side, sloping bottom of coral rubble, *Fungia*, and soft coral, 30 m, rotenone, J. E. Randall, G. W. Tribble, R. P. H. Rutherford, and K. E. Carpenter, 28 June 1978.

**Diagnosis.** Caudal fin slightly rounded; males with two to four dorsal soft rays greatly produced (large females may have these rays slightly prolonged); gill rakers 14 to 17; depth of body 3.0 to 3.3 in standard length; two dark stripes from eye to posterior part of body, the uppermost dislocated above pectoral fin; between these stripes two short stripes originating beneath pectoral fin.

**Description.** Dorsal rays IX,11; anal rays III,9; pectoral rays 14 (one of 15 paratypes with

Table 2. Proportional measurements of type specimens of *Paracheilinus carpenteri* expressed as a percentage of the standard length.

	Holotype	Paratypes				
	BPBM 22424 Male	BPBM 22465 Juv.	BPBM 22465 Female	BPBM 22465 Female	BPBM 22465 Female	BPBM 22465 Male
Standard length (mm)	39.0	24.8	33.9	44.0	47.0	65.8
Depth of body	33.1	32.3	31.5	32.2	30.4	30.4
Width of body	14.6	15.7	15.9	14.2	15.1	13.5
Head length	34.1	36.1	33.9	33.8	33.4	30.4
Snout length	9.0	8.9	8.8	8.6	8.8	8.1
Orbit diameter	9.7	11.3	10.0	8.6	8.3	6.6
Bony interorbital width	8.3	8.5	8.3	8.0	8.3	7.6
Length of upper jaw	9.1	9.1	9.1	8.5	8.7	7.6
Least depth of caudal peduncle	15.4	15.7	15.9	15.0	14.8	14.1
Length of caudal peduncle	16.9	17.3	17.6	17.9	17.8	17.8
Snout to origin of dorsal fin	33.8	38.3	35.4	34.8	34.0	30.5
Snout to origin of anal fin	59.2	63.1	61.9	60.2	58.3	57.0
Length of caudal fin	26.1	26.6	25.1	24.8	24.5	24.2
Length of pectoral fin	22.3	20.6	20.4	21.3	22.1	22.5
Length of pelvic fin	16.7	15.9	15.3	13.9	16.6	15.3
Length of first dorsal spine	6.2	6.9	6.5	6.8	6.4	4.7
Length of last dorsal spine	16.1	14.1	14.7	15.3	14.5	15.0
Length of longest dorsal ray	36.7	17.7	17.9	26.6	35.5	53.0
Length of dorsal fin base	55.1	51.2	52.6	54.3	53.2	55.2
Length of first anal spine	9.0	8.9	8.8	8.9	9.1	9.9
Length of third anal spine	13.3	12.1	12.7	12.3	broken	12.2
Length of longest anal ray	22.3	14.1	15.3	16.6	20.8	26.3
Length of anal fin base	27.2	25.4	24.5	24.5	26.6	27.2

13), all except upper two branched; lateral-line scales  $15+5$  (14 to 17+4 to 6); scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 6 (6 or 7); median predorsal scales 5 (one of 15 paratypes with 4 and one with 6); gill rakers 15 (14 to 17).

Depth of body 3.02 (3.09~3.29) in SL; width of body 2.26 (1.98~2.25) in depth; head 2.93 (2.77~3.29) in SL; profile of forehead slightly convex; snout 3.80 (3.76~4.05) in head; orbit diameter 3.52 (3.19~4.61) in head; interorbital space convex, the bony width 4.11 (4.01~4.25) in head; least depth of caudal peduncle 2.21 (2.13~2.30) in head.

Mouth small, terminal, and oblique, the maxilla not reaching a vertical at front edge of orbit; dentition typical of the genus with three pairs of upper and one pair of lower curved canines anteriorly in jaws; a single series of small conical teeth in jaws (about 25 on each side of upper jaw and 18 on each side of lower jaw of holotype). Lower lip with a thin flap projecting downward on side of jaw, its greatest depth contained about 3 times in orbit diameter; gill rakers short, the longest contained about 2 times in longest gill filament of first arch, and about 6 times in orbit diameter. Nostrils very small and inconspicuous, the posterior nearly in line with a vertical at front edge of orbit and with a horizontal at top of orbit, the anterior in a very short membranous tube; distance between anterior and posterior nostrils contained about 3 times in orbit diameter.

Head covered with large scales except snout, chin, and all of interorbital space; two rows of scales on cheek between eye and corner of preopercle; a single row of large elongate pointed scales along base of dorsal and anal fins; large scales on base of caudal fin extending almost half length of fin; paired fins without scales except for two large overlapping medial scales extending posteriorly from base of pelvic fins.

Orbit encircled by 11 prominent pores of cephalic lateral-line system; two mid-dorsal pores in upper interorbital space; two prominent pores dorsally on snout, one in front of anterior nostril and one forming the apex of a triangle with nostrils; a series of pores on nape at anterior margin of scaled region, linking with the most posterior of the two above-mentioned mid-dorsal pores; a series of pores along preoperc-

ular edge joining with four on mandible.

Caudal fin slightly rounded, the longest rays 1.31 (1.26~1.36) in head. Origin of dorsal fin over second lateral-line scale, slightly anterior to upper pectoral base; first dorsal spine 5.50 (5.21~6.48) in head; remaining dorsal spines progressively longer, the ninth 2.12 (2.03~2.56) in head; males with two to four dorsal soft rays greatly prolonged (the first, third, fifth, and seventh rays); some large females with these rays slightly produced; longest nonfilamentous (even-numbered) dorsal soft ray 2.0 (1.90~2.35) in head. Origin of anal fin beneath base of first dorsal soft ray; first anal spine moderately long, 3.79 (3.07~4.06) in head; third anal spine 2.56 (2.49~2.98) in head; sixth to eighth anal soft ray the longest, 1.53 (1.15~2.56) in head (longer in larger individuals); pectoral fins not long, reaching posterior to pelvic tips but not to a vertical at anus, the longest ray 1.53 (1.35~1.75) in head; pelvic fins short, not approaching anus, the longest ray 2.04 (1.99~2.43) in head.

Color of holotype in alcohol pale yellowish, becoming whitish on about ventral fourth of body, with narrow dark stripes as follows: from nape along base of dorsal fin; from upper part of eye diagonally upward to just below fourth to fifth lateral-line scale, commencing again below sixth lateral-line scale horizontally nearly to caudal fin base; from above upper pectoral base horizontally to below beginning of soft portion of dorsal fin; from snout (as two dashes) to orbit at level of center of eye, reappearing behind eye and continuing to upper base of pectoral where it joins a band that encircles pectoral base and one that passes horizontally beneath pectoral fin parallel to the stripe above, but extending slightly more posterior; from lower pectoral base to caudal fin base; from behind upper lip near corner of mouth passing under eye and across thorax; dorsal fin dusky with a row of dark-edged pale spots in middle of fin (larger in soft portion), and a black area basally on last three interradial membranes just below row of pale spots; basal two-thirds of caudal fin blackish, outer third pale; fin rays of median fins faintly bluish; remaining fins pale. Females are paler with basically the same stripes but these are very narrow and partially broken; fins entirely pale.

Color of holotype when fresh orange (some

males yellow-orange and others red-orange), the lower fourth of head and body pale yellow, with blue stripes; dorsal fin yellow, the membranes at tips of spines and nonfilamentous rays blue; row of spots in dorsal fin blue; caudal fin blackish with a vertical violet band in middle of fin and violet posterior margin (red on some individuals), the upper and lower edges of fin narrowly red (progressively narrower posteriorly) with three or four pale flecks; anal fin red, yellow at extreme base, with a row of pink spots just distal to basal yellow portion and a pale pink margin; pectoral fins pale, the edges and tips of rays red; pelvic fins mainly red, becoming yellow medially, with some blue on lateral edge.

Color of a female (BPBM 22465, 44 mm SL) when fresh light red, the abdomen, thorax, and lower part of head whitish, with poorly defined narrow reddish violet stripes; a series of very faint cream blotches along back and in two vertical rows on caudal peduncle (one anterior and one near caudal base); dorsal fin pale salmon pink, finely dotted and flecked with whitish, the distal ends of membranes at spine tips blue; caudal fin pale yellowish, flecked with whitish, with a broken vertical pink line in middle of fin, a red posterior margin and narrow red upper and lower margins toward base of fin containing a series of pale pink spots; anal fin pale red with a row of light red spots at base, a median row of pink spots, some scattered blue dots and whitish flecks, and a very narrow blue margin; pectoral fins pale with red margins on the rays; pelvic fins whitish.

**Remarks.** This species is named in honor of Kent E. Carpenter who was the principal collector of the type specimens; he also assisted the authors in many other ways.

*Paracheilinus carpenteri* is most closely related to *P. mccoskeri* of the Indian Ocean and may be the western Pacific counterpart of that species. The two may be differentiated, as indicated in the Key, by the single prolonged dorsal soft ray of *P. mccoskeri* compared to two to four prolonged rays for *P. carpenteri*, in the longer non-filamentous dorsal rays of *mccoskeri*, and in some slight differences in color; also *carpenteri* has a higher average number of gill rakers.

*Paracheilinus carpenteri* is thus far known only from the Philippine Islands in the depth range of

27 to 40 m, but it may be expected from other localities such as Indonesia.

### *Paracheilinus filamentosus*

(Pl. 2C)

*Paracheilinus filamentosus* Allen, 1974: 449, 452, fig. 2 (type locality, Kranket Island, Madang, New Guinea).

**Diagnosis.** Caudal fin emarginate, becoming lunate in males; two to six soft dorsal rays of males greatly prolonged (may be slightly prolonged in females), these being the odd-numbered rays beginning with the first; gill rakers 13 to 16; profile of forehead nearly straight; depth of body 3.1 to 3.65 in SL; snout 3.1 to 3.7 in head (relatively longer in adults); nonfilamentous rays of dorsal fin approximately equal in length, the longest 1.7 to 2.3 in head; five red to magenta stripes on body below lateral line (discounting one on thorax) which may or may not persist on preserved specimens as narrow dark lines.

**Remarks.** The holotype (AMS I. 16994-001, 62.6 mm SL) is deposited in the Australian Museum. The largest specimen (BPBM 14658) measures 65 mm SL; it was collected in New Guinea with the holotype. Allen (1974) also recorded the species from the Molucca Islands in Indonesia and from the Solomon Islands. He gave the depth range of his specimens as 5 to 35 m. He commented on the zooplankton feeding habits and described the courtship and spawning.

Additional specimens of *P. filamentosus* have been collected off Manado, Celebes in 22 to 24 m by Gordon W. Tribble (BPBM 22509, 4, 17~45 mm SL) and at Corcoro Island, Cuyo Islands, Philippines in 12 to 20 m by V. G. Springer, K. E. Carpenter, L. W. Knapp, R. Miclat, and J. Libbey (USNM 219009, 5, 25~43 mm SL; BPBM 22508, 2, 37~50 mm SL). Adult females of the Philippine specimens fail to show the slight prolongation of anterior odd-numbered dorsal soft rays.

### *Paracheilinus angulatus*, sp. nov.

(Pl. 2D; Table 3)

**Holotype.** BM(NH) 1979.1.3.3, male, 51.1 mm SL, Philippine Islands, Luzon, Batangas, obtained by R. Lubbock from aquarium fish collectors in August, 1978.

**Paratype.** BPBM 22526, male, 59.9 mm SL,

collection data as for holotype.

**Diagnosis.** Caudal fin emarginate (at least in adult males); no dorsal rays prolonged as filaments; gill rakers 15 to 17; depth of body 3.2 to 3.3 in standard length; no dark markings on body; one to four dark horizontal lines on head.

**Description.** Dorsal rays IX,11; anal rays III,9; pectoral rays 14 (all but upper two branched); lateral-line scales 17+7(17+6 or 7); scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 7; predorsal scales 5; gill rakers 15(17).

Body moderately elongate, the depth 3.21 (3.33) in SL, and compressed, the width 2.04 (1.98) in depth; head 3.10 (3.31) in SL; snout 4.34 (4.02) in head; orbit diameter 4.02 (4.11) in head; interorbital space convex, the bony width 4.34 (3.85) in head; least depth of caudal peduncle 2.06 (2.15) in head.

Mouth small, terminal and oblique, the maxilla nearly reaching a vertical at anterior edge of orbit. Five canine teeth (probably an abnormality for six pairs) at front of upper jaw, the median three teeth projecting forward and curving laterally and slightly downward, the two lateral teeth (more than twice as large as median teeth) projecting outward and downward and curving posteriorly; a row of small teeth medial to anterior canines, and a row of slightly larger teeth along side of jaw (about 18 on each side of holotype); one pair of large protruding canine teeth anteriorly in lower jaw which curve strongly laterally and slightly upward (in the holotype these teeth almost strike the base of the lateral upper canines when mouth is closed); a few small teeth medial to large lower canines, and a row of about 15 teeth along each side of jaw about the same size as the comparable upper teeth. Lower lip with a thin flap projecting downward on side of lower jaw, its greatest depth contained about 5 times in orbit. Gill rakers rather short, the longest about  $3\frac{1}{2}$  in longest gill filament, about 6 in orbit. Nostrils small and inconspicuous, the posterior before upper edge of eye, the anterior in a short membranous tube diagonally downward in front of posterior nostril, the distance between the two openings contained about  $2\frac{1}{2}$  times in orbit.

Head covered with relatively large scales except snout, chin and anterior part of interorbital

space; two rows of scales on cheek between eye and margin of preopercle; a row of large elongate pointed scales along base of dorsal fin above the single row of large scales superior to lateral line; a comparable row of scales along base of anal fin; basal half to third of caudal fin scaled, the scales posterior to lateral line enlarged; paired fins not scaled except for two mid-ventral scales posterior to origin of pelvic fins.

Orbit encircled by 11 prominent pores of cephalic lateral-line system; two pores on upper snout on each side; two mid-dorsal pores in upper interorbital space; three in a curved line on each side at front of nape linked to posterior mid-dorsal pore; a pore at upper end of preopercular margin with another a short distance posteriorly; remaining pores of preopercular series partly obscured by scales; a series of four mandibular pores running anterior to lower preopercular series.

Table 3. Proportional measurements of type specimens of *Paracheilinus angulatus* expressed as a percentage of the standard length.

	Holotype	Paratype
	BM(NH) 1979.1.3.3	BPBM 22526
Standard length (mm)	51.1	59.9
Depth of body	31.1	30.1
Width of body	15.3	15.2
Head length	32.3	30.2
Snout length	7.4	7.5
Orbit diameter	8.0	7.3
Bony interorbital width	7.4	7.8
Length of upper jaw	7.2	6.8
Least depth of caudal peduncle	15.7	14.0
Length of caudal peduncle	17.4	18.5
Snout to origin of dorsal fin	34.2	32.7
Snout to origin of anal fin	58.9	57.8
Length of caudal fin	31.3	29.0
Caudal concavity	7.6	11.0
Length of pectoral fin	—	20.0
Length of pelvic fin	—	—
Length of first dorsal spine	4.3	3.5
Length of last dorsal spine	12.5	13.0
Length of longest dorsal ray	24.5	30.6
Length of dorsal fin base	52.8	55.3
Length of first anal spine	4.7	6.0
Length of third anal spine	7.8	8.7
Length of longest anal ray	28.6	32.4
Length of anal fin base	24.5	24.9

Caudal fin emarginate, somewhat damaged in both specimens. Origin of dorsal fin above third lateral-line scale, slightly anterior to upper base of pectoral fin; first dorsal spine 7.50 (8.62) in head; remaining dorsal spines progressively longer, the last 2.58 (2.32) in head; ninth dorsal soft ray the longest, 1.32 (0.99) in head. Origin of anal fin beneath base of first dorsal soft ray; first anal spine 6.88 (5.03) in head; next two spines progressively longer, the third 4.13 (3.48) in head; seventh (eighth) anal soft ray the longest, 1.13 (0.93) in head. Posterior margins of dorsal and anal fins pointed. Pectoral fins reaching posteriorly to a vertical through base of eighth or ninth dorsal spine, 1.51 in head in paratype; pelvic fins damaged, but probably short as in other members of the genus.

Color of holotype in alcohol uniform pale brown with the exception of four broken approximately horizontal dark brown lines: the first from nape along dorsal fin base, the second from snout past upper part of eye to just below fourth lateral-line scale, the third from posterior margin of eye to center of operculum, and the fourth from upper lip to lower margin of eye. Only the second of these lines is present on the paratype.

Color of holotype shortly after death (from 35 mm color transparency): head and body orange, becoming pale yellowish orange ventrally, with seven approximately horizontal violet stripes: the first running from nape along dorsal fin base, becoming fainter posteriorly; the second from snout past upper part of eye to caudal fin base (the stripe disappears below fourth lateral line scale and reappears below eighth lateral line scale); the third from behind posterior

margin of operculum to just in front of eighteenth lateral-line scale; the fourth from posterior margin of orbit past upper edge of pectoral fin base to caudal fin base; the fifth from the center of pectoral fin base to lower margin of caudal peduncle; the sixth from lower margin of pectoral fin base to posterior part of anal fin base; the seventh from upper lip past lower margin of eye to approximately base of first anal soft ray. Iris reddish. Dorsal fin red, becoming orange anteriorly, with irregular greenish yellow median spots on soft portion and a light distal margin; anal fin red with violet tinges basally and irregular yellow median spots posteriorly; distal margin of anal fin pale; caudal fin reddish orange basally, greenish yellow posteriorly; pelvic and pectoral fins hyaline, the latter with a canary yellow base.

**Remarks.** This species is named *angulatus* in reference to pointed posterior portions of the dorsal and anal fins. Only two specimens are known, both obtained from an aquarium fish collector who gave the locality as Batangas, Luzon. No information is available on depth or habitat. Although we have both dived and collected fishes in Batangas, we have not seen this species underwater.

Of the known species of *Paracheilinus*, *P. angulatus* is most closely related to *P. hemitaeniatus*, differing as indicated in the key by the deeper body, less concavity in the posterior margin of the caudal fin, and in lacking dark markings on the body.

#### *Paracheilinus hemitaeniatus*

(Fig. 1)

*Paracheilinus hemitaeniatus* Randall and Har-

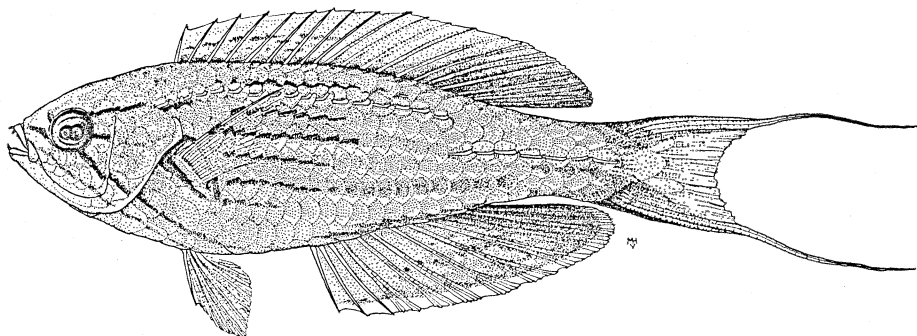


Fig. 1. Holotype of *Paracheilinus hemitaeniatus*, male, 67.6 mm SL, Madagascar, BPBM 19599 (after Randall and Harmelin-Vivien, 1977).

melin-Vivien, 1977: 338, fig. 4 (type locality, Tuléar, Madagascar).

**Diagnosis.** Caudal fin varying from slightly emarginate in juveniles to deeply lunate in males; no prolonged dorsal soft rays; gill rakers 14 to 16; profile of forehead slightly convex; depth of body 3.3 to 4.1 in SL; snout 3.7 to 3.85 in head; six longitudinal dark brown lines on anterior third of body; three dark brown lines radiating posteriorly from eye and two anteriorly.

**Remarks.** Known only from the type specimens from the outer reef slope in 42 to 45 m off Tuléar, Madagascar. The largest specimen is the holotype (BPBM 19599, 67.6 mm SL).

#### Acknowledgments

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- (JER: Bernice P. Bishop Museum, Box 19000-A, Honolulu, Hawaii 96819, USA; RL: Zoological Laboratory, University of Cambridge, Downing St., Cambridge, CB2 3EJ, England).

#### ベラ科 *Paracheilinus* 属とフィリピンから得られた 3 新種について

John E. Randall • Roger Lubbock

フィリピンから、ベラ科 *Paracheilinus* 属の 3 新種を記載した。*P. lineopunctatus* は、小型で、尾鰭は円く、雄では背鰭軟条の前方 4~6 条が延長し、鱗列に沿って破線状の暗色の模様がある。*P. carpenteri* は *P. mccoskeri* に酷似するが、尾鰭は円く、雄では背鰭軟条の中 2~4 本が延長し、体側には 6 本の暗帯 (4 本は体の前半のみ、生時は青色) がある。*P. angulatus* は、尾鰭後縁が凹み、背鰭軟条は延長せず、背鰭と臀鰭の後縁は鋭角に終り、体側に斑紋は無い。この結果 *Paracheilinus* 属は 7 種類となった。他の 4 種は、紅海からしられる *P. octotaenia*、インドネシアとメラネシアからしられ、今回フィリピンからも記録された *P. filamentosus*、コモロ諸島からしられ、今回東部アンダマン海から記録された *P. mccoskeri*、マダガスカルからしられる *P. hemitaeniatus* である。

### Explanation of plates

#### Plate 1

- A. *Paracheilinus octotaenia*, 70.0 mm SL, Gulf of Aqaba, Red Sea, BPBM 13856.
- B. Top: Holotype of *Paracheilinus lineopunctatus*, male, 38.8 mm SL, Mactan Island, Cebu, Philippines, BPBM 22506. Bottom: Paratype of *P. lineopunctatus*, juvenile, 25.3 mm SL, BPBM 22114.
- C. *Paracheilinus mccoskeri*, male, 57.0 mm SL, Male Atoll, Maldive Islands, BPBM 22590.

#### Plate 2

- A. Holotype of *Paracheilinus carpenteri*, male, 39.0 mm SL, Mactan Island, Cebu, Philippines, BPBM 22424.
- B. Paratype of *Paracheilinus carpenteri*, female, 44.0 mm SL, Caban Island, Batangas, Luzon, BPBM 22465.
- C. *Paracheilinus filamentosus*, male, 54.0 mm SL, Guadalcanal, Solomon Islands, BPBM 16007.
- D. Holotype of *Paracheilinus angulatus*, male, 51.1 mm SL, Batangas, Luzon, BM(NH) 1979.1.3.3.



A



B

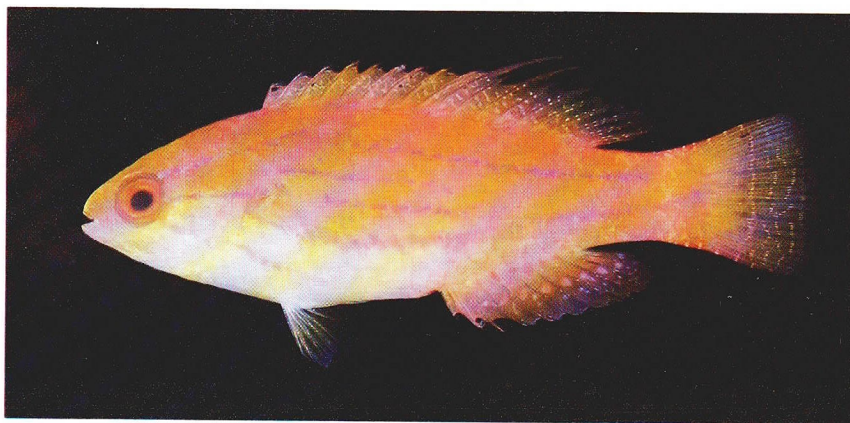


C

A



B



C



D

